

113/05/00-182

## Certificate

REPUBLIEK VAN SUID AFRIKA

REPUBLIC OF SOUTH AFRICA

PATENT KANTOOR  
DEPARTEMENT VAN HANDEL  
EN NYWERHEID

PATENT OFFICE  
DEPARTMENT OF TRADE AND  
INDUSTRY

Hiermee word gesertifiseer dat  
This is to certify that

the documents attached hereto are true copies of the Forms P2,  
P6, provisional specification and drawings of South African Patent Application  
No. 2004/0678 in the names of Eichhorn Robert and Bogdanovic Bogdan

Filed : 28 January 2004 ✓


Entitled : SEALING ARRANGEMENT

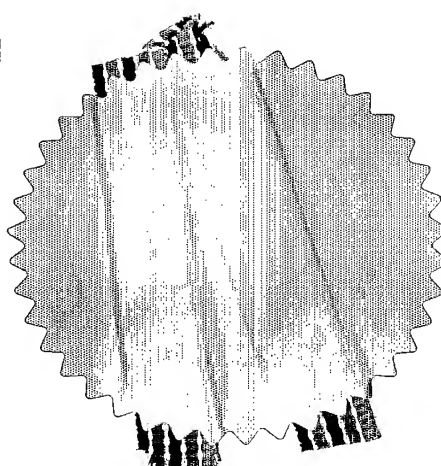
## PRIORITY DOCUMENT

SUBMITTED OR TRANSMITTED IN  
COMPLIANCE WITH RULE 17.1(a) OR (b)

Geteken te **PRETORIA** in die Republiek van Suid-Afrika, hierdie  
Signed at in the Republic of South Africa, this

30 dag van **March 2005**  
day of

  
Registrar of Patents



| REPUBLIC OF SOUTH AFRICA  |  | REGISTER OF PATENTS       |                    | PATENTS ACT, 1978 |     |
|---|--|---------------------------|--------------------|-------------------|-----|
| OFFICIAL APPLICATION  |  | LODGING DATE: PROVISIONAL |                    | ACCEPTANCE DATE   |     |
| 21  | 01   | 22                        | 28 JAN 2004        | 47                |     |
| INTERNATIONAL CLASSIFICATION  |  | LODGING DATE: COMPLETE    |                    | GRANTED DATE      |     |
| 51  |  | 23                        |                    |                   |     |
| FULL NAME(S) OF APPLICANT(S)/PATENTEE(S)  |  |                           |                    |                   |     |
| 71  | EICHHORN, ROBERT<br>BOGDANOVIC, BOGDAN       |                           |                    |                   |     |
| APPLICANTS SUBSTITUTED:   |  |                           |                    | DATE REGISTERED   |     |
| 71  |  |                           |                    |                   |     |
|   |  |                           |                    |                   |     |
|   |  |                           |                    |                   |     |
| ASSIGNEE(S)   |  |                           |                    | DATE REGISTERED   |     |
| 71  |  |                           |                    |                   |     |
|   |  |                           |                    |                   |     |
|   |  |                           |                    |                   |     |
| FULL NAME(S) OF INVENTOR(S)   |  |                           |                    |                   |     |
| 72  | 1. EICHHORN, ROBERT<br>2. BOGDANOVIC, BOGDAN |                           |                    |                   |     |
| PRIORITY CLAIMED  |  | COUNTRY                   |                    | NUMBER            |     |
| N.B. Use International abbreviation for country (see Schedule 4)  |  | 33                        | NIL                | 31                | NIL |
|   |  |                           |                    | 32                | NIL |
| TITLE OF INVENTION  |  |                           |                    |                   |     |
| 54  | SEALING ARRANGEMENT                          |                           |                    |                   |     |
| ADDRESS OF APPLICANT(S)/PATENTEE(S)   |  |                           |                    |                   |     |
| 1. 31P THE HATCH, SUNNY ROAD, BENONI, 1501, GAUTENG, SOUTH AFRICA<br>2. 19 NIGHTINGALE CRESCENT, RAND-EN-DAL, KRUGERSDORP, SOUTH AFRICA |  |                           |                    |                   |     |
| ADDRESS FOR SERVICE   |  |                           |                    | S & F REF         |     |
| 74  | SPOOR & FISHER, SANDTON                      |                           |                    | PA136741/P        |     |
| PATENT OF ADDITION NO.  |  |                           | DATE OF ANY CHANGE |                   |     |
| 61  |  |                           |                    |                   |     |
| FRESH APPLICATION BASED ON  |  |                           | DATE OF ANY CHANGE |                   |     |
|   |  |                           |                    |                   |     |

**APPLICATION FOR A PATENT**  
AND ACKNOWLEDGEMENT OF RECEIPT  
(Section 30 (1) – Regulation 22)**R 0060.00**

The granting of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

HASR 711

INKOMSTE

OFFICIAL APPLICATION NO.

|    |    |           |
|----|----|-----------|
| 21 | 01 | 2004/0678 |
|----|----|-----------|

|   |            |
|---|------------|
| REPUBLIC OF SOUTH AFRICA<br>S & F REFERENCE | PA136741/P |
|---|------------|

FULL NAME(S) OF APPLICANT(S)

|    |  |
|----|--|
| 71 | 1. EICHHORN, ROBERT<br>2. BOGDANOVIC, BOGDAN |
|----|--|

ADDRESS(ES) OF APPLICANT(S)

|   |
|---|
| 1. 31P THE HATCH, SUNNY ROAD, BENONI, 1501, GAUTENG, SOUTH AFRICA<br>2. 19 NIGHTINGALE CRESCENT, RAND-EN-DAL, KRUGERSDORP, SOUTH AFRICA |
|---|

TITLE OF INVENTION

|    |                     |
|----|---------------------|
| 54 | SEALING ARRANGEMENT |
|----|---------------------|

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. THE EARLIEST PRIORITY CLAIM IS:

|              |             |           |
|--------------|-------------|-----------|
| COUNTRY: NIL | NUMBER: NIL | DATE: NIL |
|--------------|-------------|-----------|

THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.

|    |    |  |
|----|----|--|
| 21 | 01 |  |
|----|----|--|

THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND IS BASED ON APPLICATION NO.

|    |    |  |
|----|----|--|
| 21 | 01 |  |
|----|----|--|

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. A single copy of a provisional specification of 6 pages.
- ☒ 2. Drawings of 8 sheets.
- ☐ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☐ 4. A copy of Figure of the drawings (if any) for the abstract.
- ☐ 5. Assignment of invention.
- ☐ 6. Certified priority document.
- ☐ 7. Translation of the priority document.
- ☐ 8. Assignment of priority rights.
- ☐ 9. A copy of the Form P.2 and the specification of S.A. Patent Application No.
- ☐ 10. Declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☒ 13. Form P.2 in duplicate.
- ☐ 14. Other.

|    |  |
|----|--|
| 74 | ADDRESS FOR SERVICE: SPOOR & FISHER, SANDTON |
|----|--|

Dated: 28 January 2004


SPOOR & FISHER  
PATENT ATTORNEYS FOR THE APPLICANT(S)REGISTRAR OF PATENTS DESIGNS,  
TRADE MARKS AND COPYRIGHTRECEIVED  
2004-01-28REGISTRATEUR VAN PATENTE, MODELLE,  
HANDELSMERKE EN OUTEURSREG

REGISTRAR OF PATENTS

REPUBLIC OF SOUTH AFRICA  
PATENTS ACT, 1978

## PROVISIONAL SPECIFICATION

(Section 30(1) – Regulation 27)

OFFICIAL APPLICATION NO.

LODGING DATE

|    |                  |               |
|----|------------------|---------------|
| 21 | 01 <sup>st</sup> | • 2004 / 0678 |
|----|------------------|---------------|

|    |                 |
|----|-----------------|
| 22 | 28 JANUARY 2004 |
|----|-----------------|

FULL NAMES OF APPLICANTS

|    |  |
|----|--|
| 71 | EICHHORN, ROBERT<br>BOGDANOVIC, BOGDAN |
|----|--|

FULL NAMES OF INVENTORS

|    |  |
|----|--|
| 72 | EICHHORN, ROBERT<br>BOGDANOVIC, BOGDAN |
|----|--|

TITLE OF INVENTION

|    |                     |
|----|---------------------|
| 54 | SEALING ARRANGEMENT |
|----|---------------------|

**FIELD OF THE INVENTION**

This invention relates to a sealing arrangement.

**SUMMARY OF THE INVENTION**

According to the invention a sealing arrangement includes a body rotatable relative to a shield, with the body containing a housing for a bearing, and wherein the arrangement including a labyrinth seal located between the shield and the body and/or a centrifugal seal formed by a curved surface on the exterior of the body.

In the preferred form of the invention the body is connected to the shield by a connector. The connector may be a hollow spigot with a flange, with the spigot extending into bore of the shield and with the collar abutting the body or a bearing in the bearing housing.

The labyrinth seal is preferably formed by a first part located on the shield and by a second part located on the body, which first and second parts overlap one another to form the labyrinth seal.

The shield preferably has a projection which projects into a bore of the body, the projection having an abutting end for abutting a stationary surface axially to space the shield from the body.

According to another aspect of the invention a sealing arrangement includes a shield and a body, with the shield having a bore for a shaft and a projection with an abutting end surface for abutting a stationary surface axially to space the shield from the body and a connector for connecting the shield to the body so that in use the body can rotate relative to the shield, with the sealing arrangement

including a labyrinth seal and/or a centrifugal seal.

In the preferred form of the invention the labyrinth seal is formed by a first part located on the shield and a second part located on the body, which first and second parts overlap to form the labyrinth seal.

The centrifugal seal is preferably formed by a curved surface on the exterior of the body.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

**Figure 1** is a cross-sectional side view of a sealing arrangement according to the invention;

**Figure 2** is a perspective view of the shield of the sealing arrangement;

**Figure 3** is a cross-sectional side view of the shield;

**Figure 4** is an end view of the shield;

**Figure 5** is a perspective view of the body of the sealing arrangement;

**Figure 6** is a cross-sectional side view of the body;

**Figure 7** is an end view of the body;

**Figure 8** is a perspective view of the connector of the sealing arrangement;

**Figure 9** is a cross-sectional side view of the connector;

**Figure 10** is a cross-sectional side view of an idler roller incorporating the sealing arrangement;

**Figure 11** is a perspective view of a bearing surrounded by a spacer;

**Figure 12** is a cross-sectional side view of the bearing and spacer; and

**Figure 13** is a cross-sectional side view of the sealing arrangement including the bearing and spacer of figures 11 and 12.

### **DETAILED DESCRIPTION OF THE DRAWINGS**

Referring firstly to figure 1 a sealing arrangement 10 has a body 12 rotatable relative to a shield 14. The body 12 has a housing 16 for a bearing 18. A labyrinth seal 20 is formed between the body 12 and the shield 14. A centrifugal seal 22 is formed by a curved surface 24 on the body 12. The body 12 is connected to the shield 14 by a connector 26.

Referring now to figures 2 to 4, the shield 14 has an outer surface 28, inner surface 30, a bore 32 within a tubular section 34. The tubular section 34 has an abutting end 36 for abutting the stationary inner race 18.1 of the bearing 18. The shield 14 also has two annular rings 38 and 40, and two annular recesses 42 and 44, which together define a first part 46 of the labyrinth seal 20. A concave surface 46 is provided on the inner surface 30 of the shield 14. The concave surface 46 terminates at an annular lip 48. The annular lip 48 has an inner inclined surface 50, an outer inclined surface 52 and inclined free end 56. Beyond the lip 48 the shield has a radially outwardly extending section 58 which terminates in an inclined free end 60.

The outer surface of the shield 14 has strengthening ribs 62. The bore 32 of the shield 14 contains a sunken ring 64 for locking engagement with the connector 26. The bore 32 also contains a raised ring 66 for location within a sunken ring 68 of a shaft 70 (see figure 10). The shield 14 is injection moulded from high density polyethylene.

Referring now to figures 5 to 7, the body 12 has an outer surface 72 and an inner

surface 74. A bearing housing 76 is formed by a circular cylindrical section 78.

A concave surface 80 is provided at the opposite end of the body 12 to the bearing housing 76.

A bore 82 is provided in the body 12. Two annular rings 84 and 86, and two annular recesses 88 and 90 together define a second part 92 of the labyrinth seal.

Referring now to figures 8 and 9, the connector 26 consists of a hollow spigot 94 with a flange 96 at one of the ends thereof. A raised ring 98 is located towards the other of the ends of the spigot 94.

Referring now to figure 10, an idler roller 100 includes a drum 102 rotatably supported on a shaft 104 via bearings 106 located within the bearing housings 76 of the respective sealing arrangements 10. The sealing arrangements 10 are pressed into receptacles 108 at opposite end of the roller 100 so that the body 12 of each sealing arrangement 10 is fixed to the drum 102, and can rotate with the drum 102.

The body 12 is axially spaced from the shield 14 because the abutting surface 36 of the shield 14 abuts the inner race of the bearing 18 (see figure 1). The connector 26 is pressed onto the shaft and the raised ring 98 of the connector 26 locates within the sunken ring 64 of the shield 14. The shield 14 is thus locked to the body 12, and the sealing arrangement 10 is a modular unit.

When the drum 102 is rotated by a conveyor belt (not shown) passing over it, the body 12 rotates with the drum 102. Any foreign particles entering a gap 110 via an opening 112 between the shield 14 and the drum 102 rotate with the concave surface 80 of the body 12, and should be flung back out of the gap 112. Should any such foreign particle not be flung out of the opening 112, it could only reach the bearing 106 after passing through the labyrinthine pathway of the labyrinth seal 20.



The raised projection 66 on the bore 32 of the shield 14 locates within a groove in the shaft 104. If the roller 100 is dropped end first onto the shaft 104, which is likely to damage the bearings, the raised ring 66 will shear and provide an indication that the roller 100 has been dropped in such a fashion and that the bearings 106 are likely to have been damaged.

Referring now to figures 11 and 12, a bearing 106.1 is surrounded by a spacer 114. The bearing 106.1 has a smaller diameter than the bearing 106. The spacer 114 has a diameter the same as that of bearing 106. Thus the spacer 114 can be pressed into the bearing housing 76. Consequently lighter duty bearings can be used in the sealing arrangement 10. A recessed region 116 is provided for the flange 96 of the connector 26.

Referring now to figure 13, a sealing arrangement 10.1 is the same as that shown in figure 1 except that the bearing 18 is replaced by bearing 106.1 and the spacer 114. The connector 26.1 is shorter than connector 26, and the flange 96.1 of the connector 26.1 locates within the recessed region 116 of the bearing and spacer.

It will be appreciated that many modifications or variations of the invention are possible without departing from the spirit or scope of the invention. For example, although the sealing arrangement has been described including a bearing housing, the bearing housing could be omitted. In such an arrangement the abutting surface of the shield could abut the flange of the connector which would connect the body and shield together to form a modular unit.

DATED THIS 28<sup>TH</sup> DAY OF JANUARY 2004



SPOOR & FISHER  
APPLICANT'S PATENT ATTORNEYS

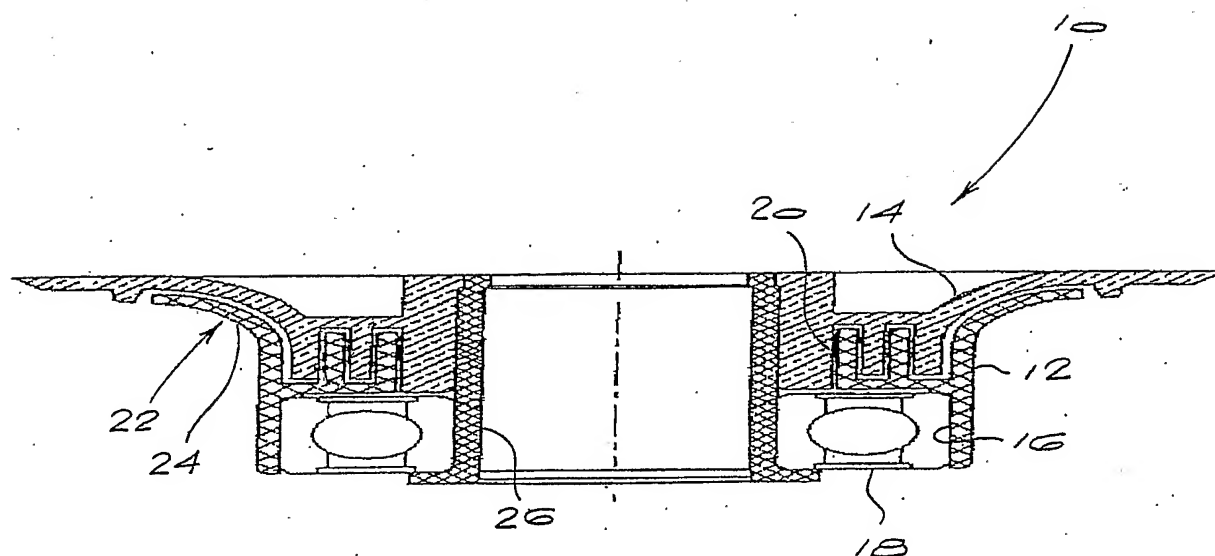


Fig.1.

*[Signature]*  
SPOOR & FISHER  
Applicant's Patent Attorneys

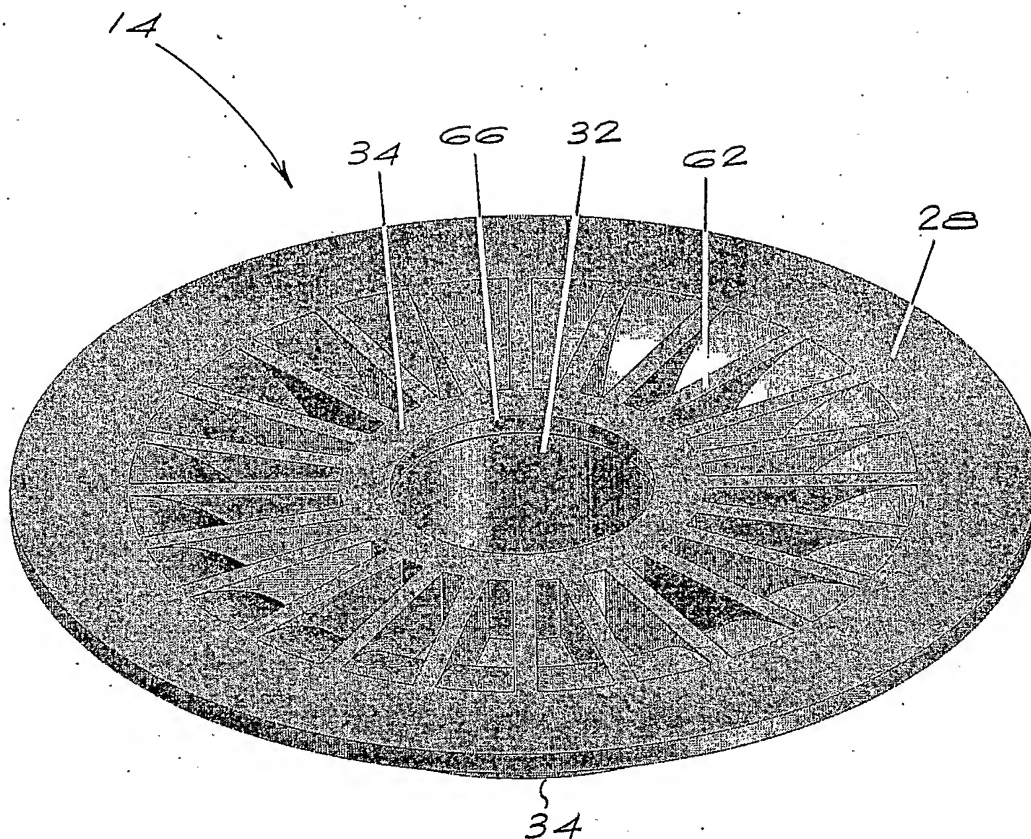


Fig. 2

*Robert Eichhorn*  
SPOOR & FISHER  
Applicant's Patent Attorneys

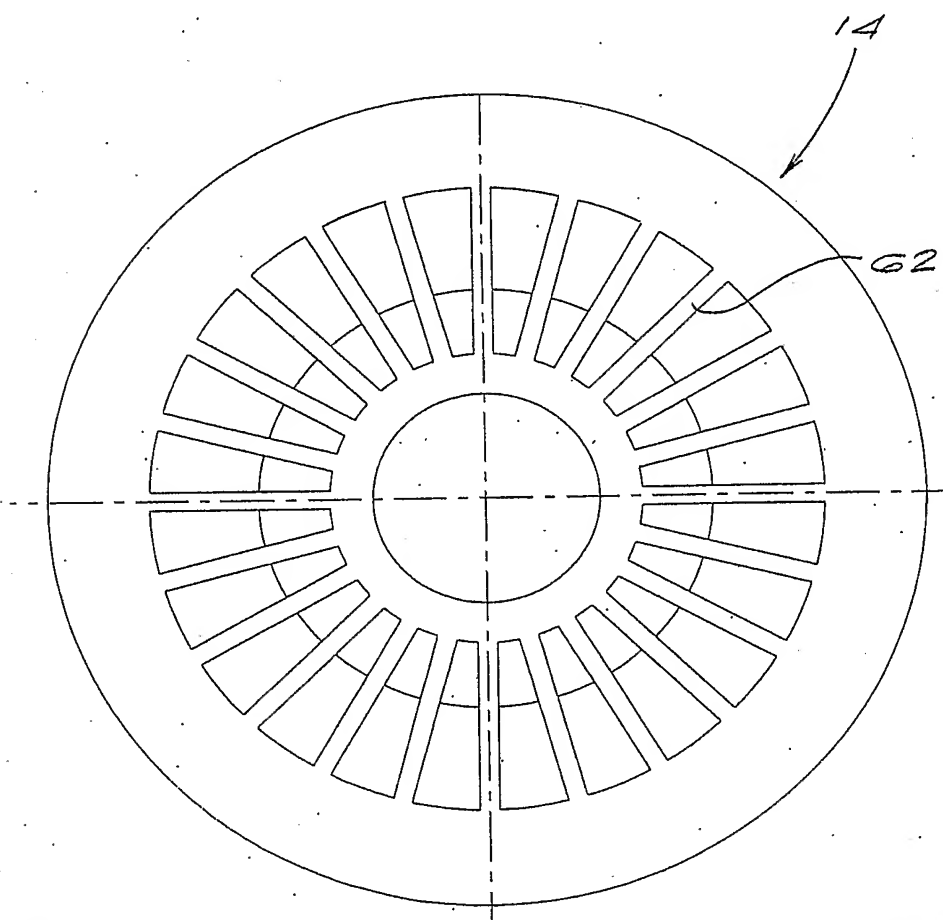
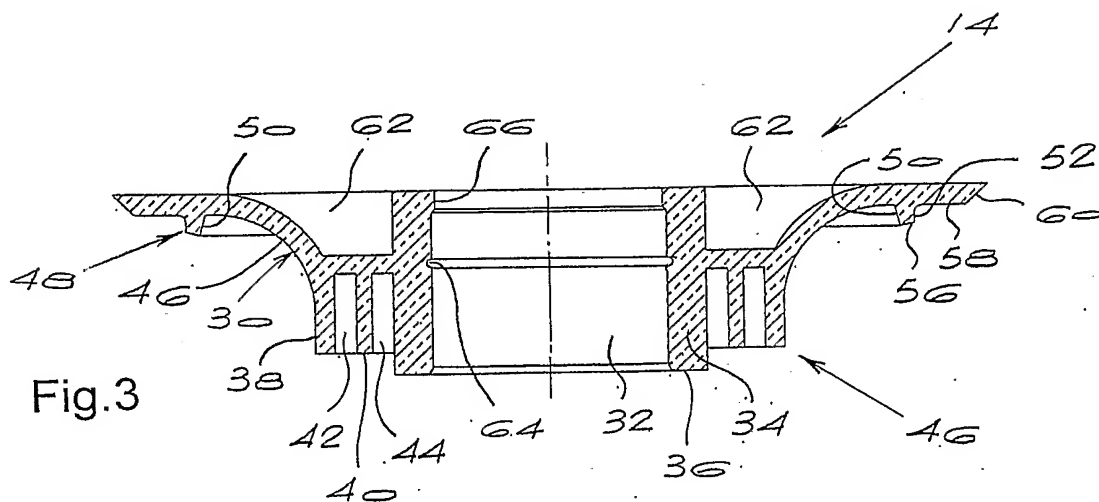


Fig.4

*Spoor & Fisher*  
SPOOR & FISHER  
Applicant's Patent Attorneys

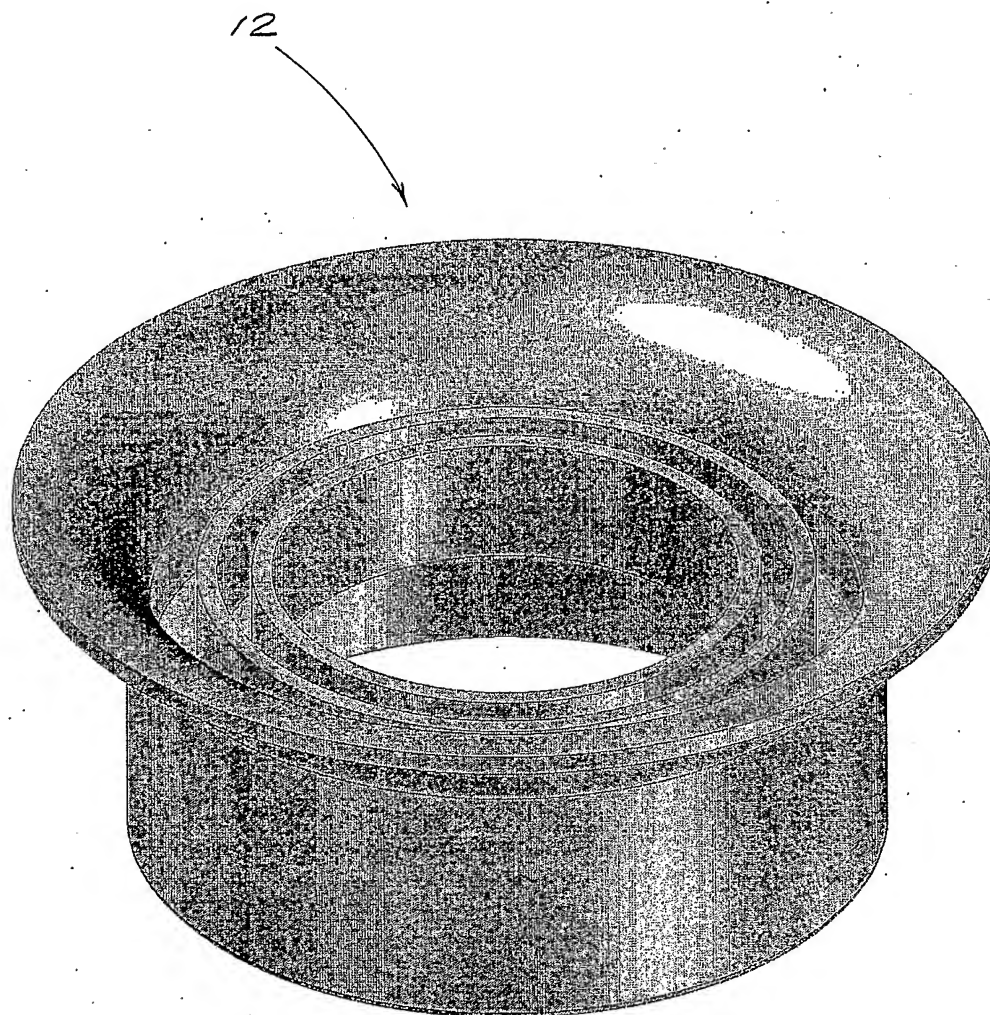


Fig.5

*W. Spoor & Fisher*  
SPOOR & FISHER  
Applicant's Patent Attorneys

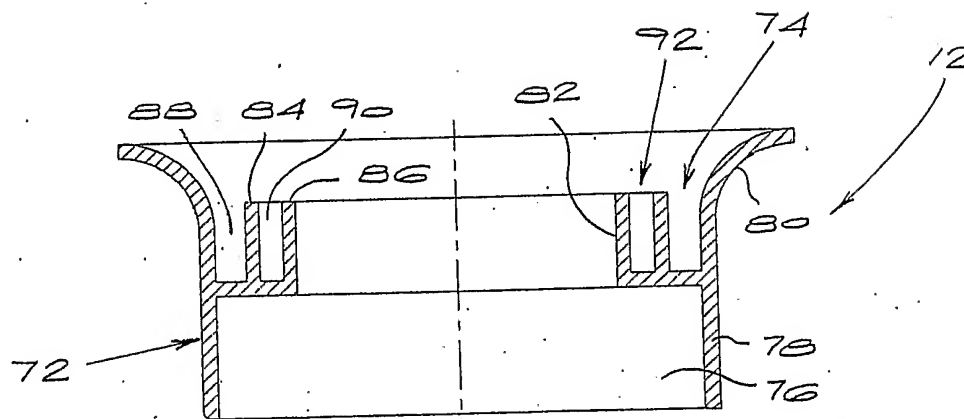


Fig. 6

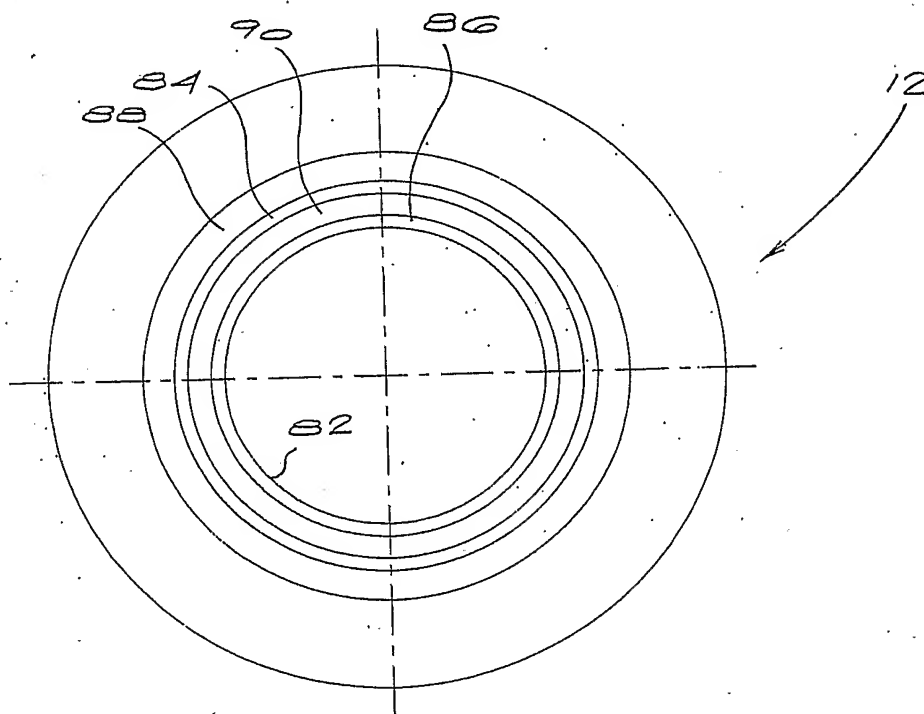


Fig. 7

*Spoor & Fisher*  
SPOOR & FISHER  
Applicant's Patent Attorneys

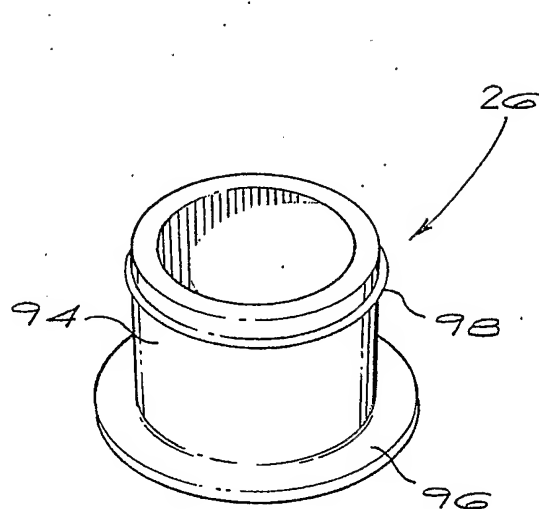


Fig. 8

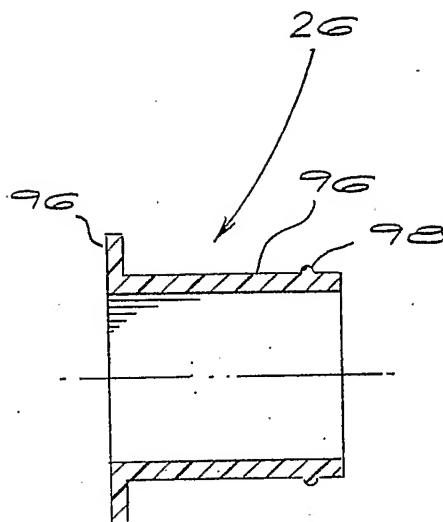


Fig. 9

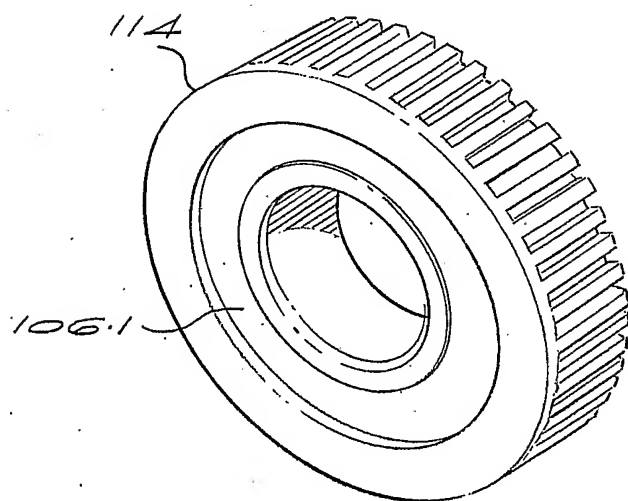


Fig. 11

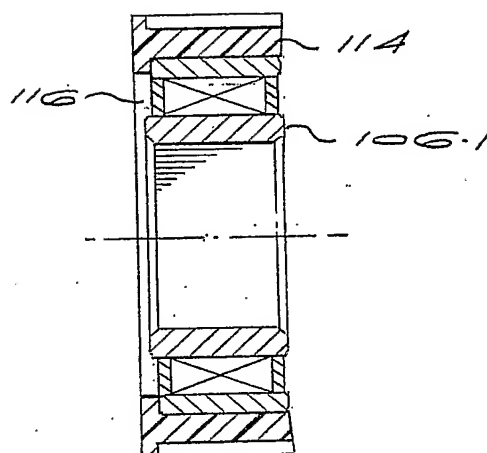


Fig. 12

*Robert Eichhorn*  
SPOOR & FISHER  
Applicant's Patent Attorneys

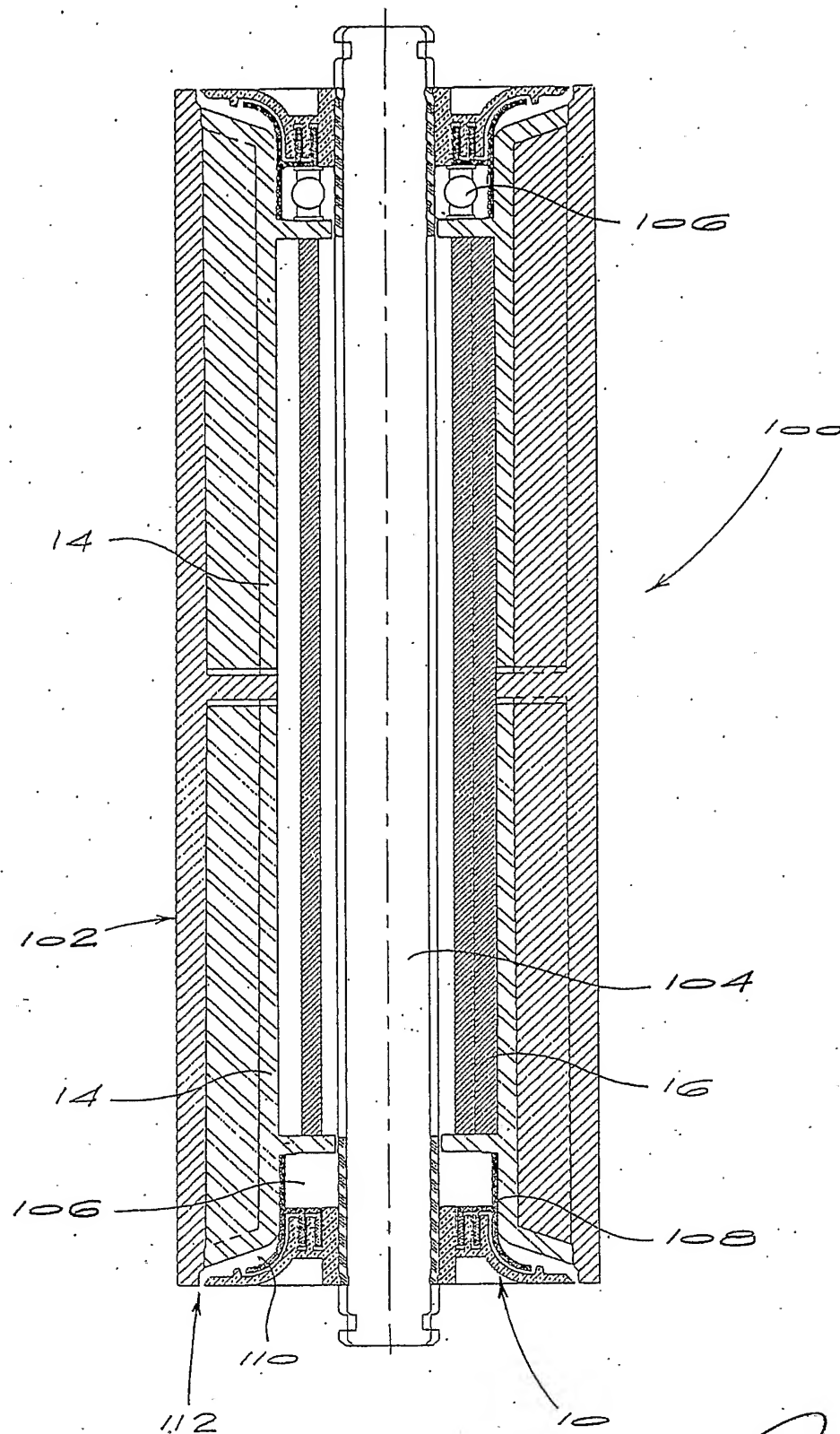


Fig.10

*Spoor & Fisher*  
SPOOR & FISHER  
Applicant's Patent Attorneys



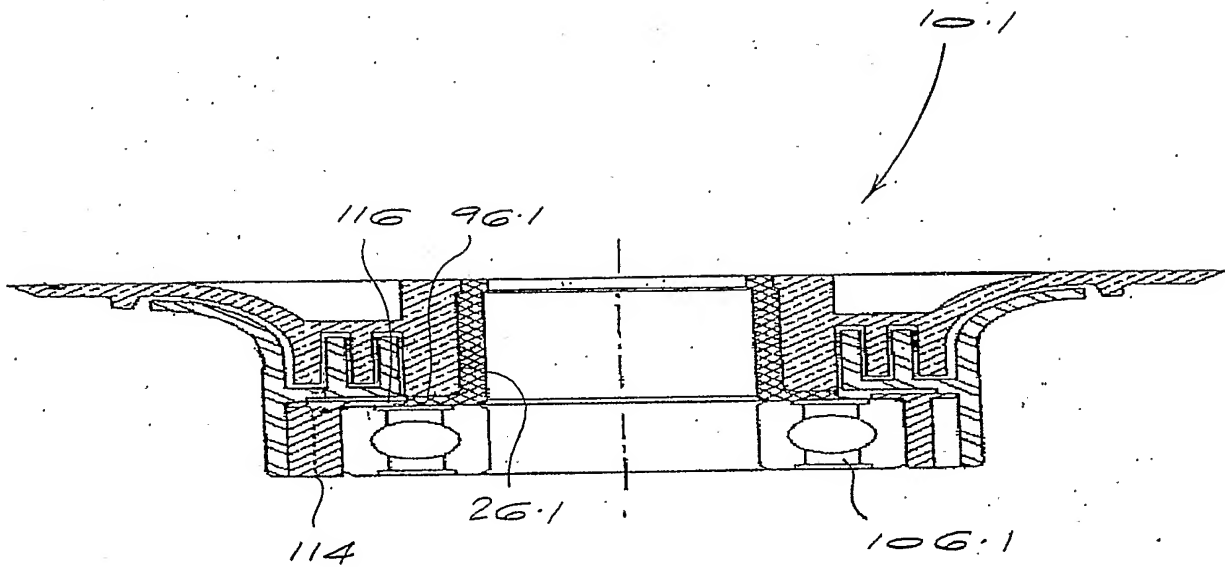


Fig.13